



Assessment of Clinical and Demographic Findings of Haematological Malignancies in Hospital Admitted Patients

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Abstract: Background: Hematological malignancies, including leukemia, lymphoma, and multiple myeloma, represent a significant subset of global cancer burden. These disorders differ in pathogenesis, clinical presentation, and prognosis. In low- and middle-income countries like Bangladesh, their incidence is rising due to limited public awareness, environmental exposures, and delayed diagnosis. Understanding socio-demographic and clinico-hematological profiles is crucial for early detection and optimal management. **Objective:** To assess the socio-demographic and clinico-hematological characteristics of patients with hematological malignancies and to classify the types among hospitalized patients. **Methods:** This cross-sectional study was conducted at Mymensingh Medical College Hospital from January to July 2019. A total of 100 newly diagnosed patients with leukemia, lymphoma, or multiple myeloma, aged 5–60 years, were selected using purposive sampling. Data on socio-demographic variables, clinical features, and laboratory findings were collected using a structured questionnaire. Statistical analysis was performed using SPSS version 15.0, with Chi-square tests applied for categorical data. **Results:** Among 100 patients, the majority were aged 16–30 years (57%), with a mean age of 31.35 ± 8.74 years. Males constituted 57% of the cohort, and 58% were from urban areas. Non-Hodgkin's lymphoma was the most common malignancy (34%), followed by acute leukemia. Smoking was identified as the leading risk factor (47%). The most frequent clinical presentations included generalized weakness (87%) and anemia (81%). Significant improvements were noted in erythrocyte sedimentation rate (ESR), white blood cell (WBC) count, and bone marrow plasma cell percentages following treatment, whereas changes in biochemical parameters were not statistically significant. **Conclusion:** The study highlights the distribution and characteristics of hematological malignancies in a tertiary care center in Bangladesh. The findings underscore the need for enhanced awareness, early diagnostic strategies, and the establishment of a national cancer registry to improve outcomes in affected patients.

Keywords: Hematological malignancies, Epidemiology, Non-Hodgkin's Lymphoma, Multiple Myeloma.

Original Researcher Article

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How to cite this article:

Mozahid MSA, Sorwer MS, Parvez MKH,
Hera MFH, Islam M; Assessment of Clinical
and Demographic Findings of
Haematological Malignancies in Hospital
Admitted Patients. TAJ 2024; 37 (2): 522-530

Article history:

Received: July 18, 2024
Accepted: September 19, 2024



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INTRODUCTION

Now-a-day, cancer is a major health burden worldwide. An estimated 12.7 million new cancer cases occurred with 7.6 million deaths (around 13% of all deaths) in 2008.^{1,2} In several less

developed countries incidence and mortality rates of most cancers are increasing due to adoption of unhealthy lifestyles. Over 9 million cancer patients are assumed to die in developing countries by the year 2030, exposure to avoidable cancer risk factors,

such as environmental carcinogens, tobacco use, alcohol abuse and infectious agents are more common among Low-income. Hematological malignancies are heterogeneous conditions originating from bone marrow and the lymphatic system cells. Cancer management is a priority due to the current trend of increased incidence in this region.³ With diverse aetiologies, epidemiology, appreciation of the similarities and differences within this complex cancer group only emerged in recent decades. In Bangladesh, there are 13 to 15 million cancer patients, about two million new patients being added each year Lung cancer and mouth-oropharynx cancer rank as the top two cancers in males, while cancer cervix uteri and breast cancer in female.⁴ Different factors are involved in the pathogenesis of tumors where presence of cancer producing agent or carcinogen and presumably promoting agents is must. Carcinogens may be chemical or physical, e.g. ionizing radiation or ultraviolet light. Hydrocarbon carcinogens present in coal tar and a series of chemicals used in the rubber industry are identified chemical carcinogens. Vinses seems to be associated with some types of human cancer mainly the leukemic group, this theory is supported by animal experiments. It is also becoming obvious that there is often an interaction between chemical carcinogens and viruses in tumor induction. Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells.⁵ Cancer is the sixth common cause of mortality in Bangladesh and 60% of cancer patients die within five years of diagnosis.^{6, 7} Etiology of blood and bone marrow cancers is poorly understood However, it is accepted that there are three types of carcinogenesis chemical carcinogenesis (chemical carcinogens-benzopyrene, asbestos and over 800 chemicals) physical carcinogenesis (physical carcinogens-toning radiation, ultraviolet radiation, etc.), mological carcinogenesis (biological carcinogens viruses, bacteria, fungus).⁸ However, in clinical practice it is practically impossible to determine the etiology, so the causal cancer treatment does not exist. Five to ten percent of cancers are approximately entirely hereditary.⁹ There are three major groups of hematological malignancy: leukemia, lymphoma, and plasma cell neoplasms. Due to different clinical features and prognosis leukemias are usually divided into four major

categories, acute lymphocytic leukemia, chronic lymphocytic leukemia, acute myelogenous leukemia, and chronic myelogenous leukemia. The incidence rates for all types of leukemia are slightly higher among males than among females. Malignant lymphomas constitute a heterogeneous group of neoplasms deriving from cells of the immune system [either B or T/natural killer (NK) lymphocytes] and primarily arising from lymphoid organs and tissues but can arise from organs normally devoid of lymphocytes. The term extranodal lymphoma usually refers to the latter group that comprises about one third of the patients. Malignant lymphomas comprise Hodgkin's lymphoma (HL) and NHLs, which consist of >30 separate disease entities with different morphology, immunologic and genetic profile, and clinical behavior.¹⁰ Study in Bangladesh reported prevalence of cancer male: female ratio was 1: 2.25. Irrespective of male & female, 23.07% has cervical cancer making it most common malignancy. In male, lung cancer (15.75%) is most common cancer followed by non-Hodgkin's lymphoma (13.75%), In female, cervical carcinoma is the top most cancer (33.33%), followed by breast cancer (32.33%). Middle and older age groups are most sufferer from cancers³.

Objectives

General Objective

To assess the socio-demographic characteristics and clinico-haematological profile of patients diagnosed with hematological malignancies.

Specific Objectives

To determine the age and sex distribution among patients with hematological malignancies.

To evaluate the socio-economic and occupational background of the patients.

To classify the types of hematological malignancies (e.g., leukemia, lymphoma, plasma cell neoplasms) diagnosed in the study population.

METHODS AND MATERIALS

Study design

This Cross-sectional descriptive study was performed at the Department of Medicine and Haematology, Mymensingh Medical College Hospital, Mymensingh, from 7th January 2019 to 26th July 2019 with approval of the institutional

review board on 23 December 2017. Confirmed cases of Acute myeloid leukaemia (AML), Acute lymphoblastic leukaemia (ALL), Chronic myeloid leukaemia (CML), Hodgkin's lymphoma, non-Hodgkin's lymphoma & multiple myeloma patients were included in the study after confirmation of diagnosis based on clinical criteria & confirmatory investigations.

Sampling Technique and Procedure

Purposive type of sampling technique was applied. Sample size was 100. Patients' demographic data, eg-age, sex, residence, Occupation, Socio-economic status occupation and previous medical history, predisposing factors, clinical features were recorded by the use of a pre-designed and easily understandable questionnaire. Percentages of different hematological malignancy was calculated. Patients were treated by different treatment modality following guidelines. Hematological and other prognostic parameters (Hb%, ESR, WBC, platelet count, Bone marrow study, FBS, 2-hour ABE, S. Calcium, S. Creatinine, Lipid profile, LFTS, B: microglobulin, S. Albumin, S. ferritin) were compared before and after treatment. After collection of all information, these data were checked, verified for consistency and edited for finalized result. After editing and coding, time coded data directly entered into the computer by using SPSS (Statistical Package for Social Science) 15.0 and. Data cleaning validation and analysis was performed Frequency & percentage was used expressing qualitative data. Chi-square test was used for comparison. "P" value <0.05 was considered as significant. Graph and chart was presented by MS excel.

Inclusion criteria

The inclusion criteria for this study encompassed patients of either sex who were diagnosed with hematological malignancies, including leukemia, lymphoma, or plasma cell neoplasms. Eligible participants were between the ages of 5 and 60 years and had been admitted to the Hematology or Oncology Department of Mymensingh Medical College Hospital during the specified study period. Only newly diagnosed cases were considered to ensure the assessment reflected clinical and demographic findings prior to the initiation of treatment.

Exclusion criteria

The exclusion criteria for the study included patients who were already receiving treatment or under follow-up for previously diagnosed hematological malignancies, as their clinical and laboratory profiles might have been altered by prior therapy. Additionally, patients diagnosed with non-hematological malignancies were excluded to maintain focus on primary hematological disorders. Cases with secondary or metastatic involvement of the hematopoietic system originating from solid tumors were also excluded, as these do not represent primary hematological malignancies.

Operational definition

Acute lymphocytic leukemia (ALL) is a malignancy of B or T lymphoblasts occurs through uncontrolled proliferation of abnormal, immature lymphocytes and their progenitors leading to replacement of bone marrow elements and other lymphoid organs Acute myeloid leukemia (AML) is a malignant disease that results from the abnormal proliferation and differentiation of myeloid stem cells in the bone marrow Chronic lymphocytic leukemia (CLL) is a monoclonal disorder characterized by a progressive proliferation and accumulation of mature yet functionally incompetent lymphocytes" Chronic myeloid leukemia (CML) is a myeloproliferative stem cell disorder resulting in proliferation of all hematopoietic lineages but manifesting predominantly in the granulocytic series. Hodgkin lymphoma (HL) is a B cell lymphoma characterized by few malignant cells and numerous immune effector cells in the tumor microenvironment". Non-Hodgkin lymphoma (NHL) is a lymphoid tissues neoplasm originating from B cell precursors, mature B cells, T cell precursors, and mature T cells. Multiple Myeloma represents a malignant proliferation of plasma cells derived from a single clone.

Statistical Analysis

Collected data were checked for completeness and consistency, then coded and entered into a computer for analysis using SPSS version 15.0. Descriptive statistics such as frequency and percentage were used for categorical variables. Comparative analysis of pre- and post-treatment parameters was performed using the

Chi-square test. A p-value of less than 0.05 was considered statistically significant. Graphs and charts were generated using Microsoft Excel.

Ethical Consideration

This study was approved by the Institutional Review Board of Mymensingh Medical College. Written informed consent was obtained from each participant prior to data collection. Confidentiality and anonymity of all participants were strictly maintained throughout the study.

RESULTS

This table shows the age distribution among 100 patients. The majority were in the 16–30 years age group, comprising 57% of the study

population, followed by 26% under 15 years of age. This finding deviates from the conventional understanding that cancer predominantly affects older adults, particularly in hematological malignancies. The predominance of younger patients in this study may be attributed to the unique epidemiological pattern in developing countries like Bangladesh, where environmental exposures, genetic predisposition, infectious agents (such as EBV and HIV), and earlier-life toxin exposures may play a more significant role in early-onset hematological cancers. Patients aged 31–45 years made up 15%, while only 2% were in the 46–60 years range. The mean age of the patients was 31.35 years, with a standard deviation of 8.74 years, indicating a predominantly young patient population in the study. (Table 1)

Table 1: Age Distribution of the Patients (n=100)

Age (years)	Number of patients	Percentage (%)	Mean ± SD
<15	26	26	31.35±8.74
16-30	57	57	
31-45	15	15	
45-60	2	2	

This table shows the socio-demographic distribution of the 100 patients enrolled in the study. Males made up a slight majority (57%), while 43% were female. In terms of residence, the majority of patients came from urban areas (58%), followed by rural (30%) and semi-urban (12%) localities. Occupational data showed that day laborers (28%) formed the largest group, reflecting a lower-income, manual labor-dependent

population. Businessmen (26%) and housewives (22%) were also significantly represented, while service holders and other occupations each comprised 12% of the sample. Socio-economic analysis revealed that a large proportion of the patients belonged to the low-income group (44%), followed by 38% in the middle-income bracket, and only 18% in the high-income group. (Table 2)

Table 2: Distribution of Patients According to Socio-Demographic Variables (n=100)

Variables	Category	Number	Percentage
Sex	Male	57	57%
	Female	43	43%
Residence	Rural	30	30%
	Urban	58	58%
	Semi-urban	12	12%
Occupation	Service holder	12	12
	Businessman	26	26
	Day laborer	28	28
	Housewife	22	22
	Others	12	12
Socio-Economy status	Low	44	44
	Middle	38	38
	High	18	18

The figure presents the distribution of potential contributing factors among 100 patients. Smoking was the most prevalent factor, identified in 47% of patients, followed by idiopathic causes in 26%, and drug exposure in 23%. A family history of cancer was reported in 15% of patients, while

infectious pathogens accounted for 12%. Radiation exposure was the least common factor, observed in only 6% of the cases. These findings highlight the multifactorial nature of the condition, with both environmental and genetic components playing significant roles. (Figure 1)

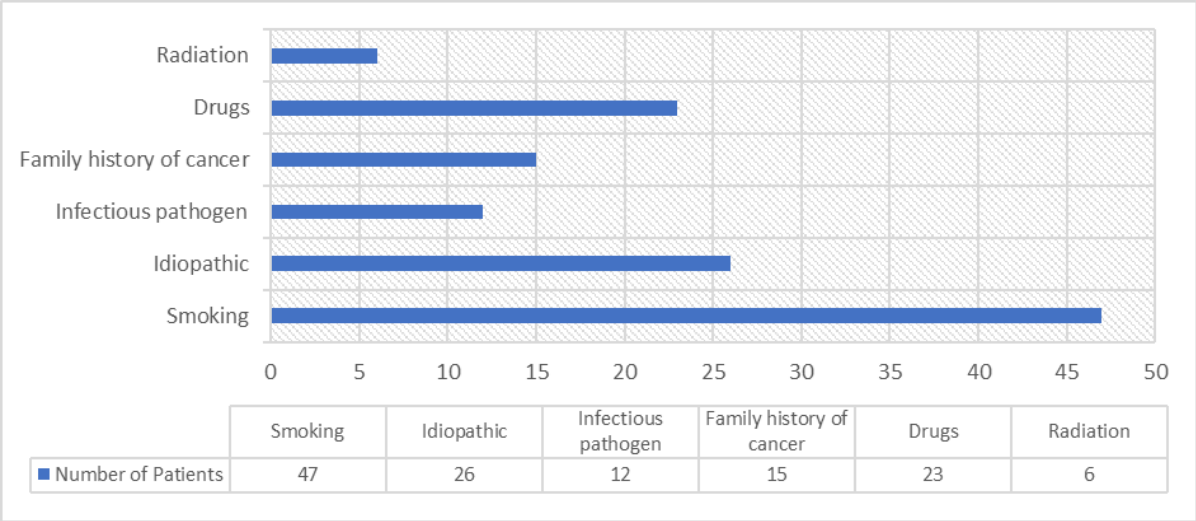


Figure 1: Past Medical History and Predisposing Factors

This table outlines the clinical manifestations among 100 patients. The most commonly reported symptoms were generalized weakness (87%) and fever (72%), followed by anorexia (56%) and abdominal pain (36%). Gastrointestinal issues such as dyspepsia (24%), vomiting (22%), constipation (21%), and abdominal distension (18%) were frequently observed. Bleeding-related symptoms included hematemesis (14%), mucosal bleeding (4%), hemoptysis (10%),

and per rectal bleeding (7%). Respiratory manifestations like cough (16%) and respiratory distress (13%) were also notable. Less common symptoms such as skin pain (6%), nodular swelling (5%), bone pain (8%), and hematuria (3%) were present in a smaller subset. This spectrum of symptoms indicates a multi-system involvement with a predominance of constitutional and gastrointestinal features. (Table 3)

Table 3: Clinical Manifestation of Respondents (0-100)

Clinical Manifestation	Number of Patients	Percentage (%)
Generalized weakness	87	87%
Fever	72	72%
Anorexia	56	56%
Dyspepsia	24	24%
Vomiting	22	22%
Diarrhea	9	9%
Constipation	21	21%
Abdominal pain	36	36%
Abdominal distension	18	18%
Hematemesis	14	14%
Chest pain	7	7%
Hemoptysis	10	10%
Respiratory distress	13	13%

Cough	16	16%
Per rectal bleeding	7	7%
Altered bowel habit	11	11%
Bone pain	8	8%
Hematuria	3	3%
Skin pain	6	6%
Mucosal bleeding	4	4%
Nodular swelling	5	5%

This table presents the clinical signs observed in 100 patients. Anemia was the most frequent sign, present in 81% of the patients, followed by lymphadenopathy (24%), swelling (19%), and hepatosplenomegaly (18%). Signs related to abdominal pathology, such as ascites (14%) and jaundice (13%), were also observed. Less

frequent findings included clubbing (8%), bony tenderness (7%), oedema (5%), and gum hypertrophy (3%). The distribution of signs reflects a broad range of systemic involvement, particularly hematological and lymphatic abnormalities, with occasional evidence of hepatic, skeletal, and mucosal changes. (Table 4)

Table 4: Clinical Sign of Malignancy (n=100)

Clinical Sign	Number of Patients	Percentage (%)
Anemia	81	81%
Jaundice	13	13%
Clubbing	8	8%
Swelling	19	19%
Lymphadenopathy	24	24%
Hepatosplenomegaly	18	18%
Ascites	14	14%
Oedema	5	5%
Bony tenderness	7	7%
Gum hypertrophy	3	3%

This table illustrates the distribution of different hematological malignancies among 100 diagnosed patients. Non-Hodgkin's Lymphoma was the most prevalent type, affecting 34% of the patients, followed by Multiple Myeloma at 17%. Other common malignancies included Acute

Myeloid Leukemia (12%), Hodgkin's Lymphoma (11%), and Chronic Lymphocytic Leukemia (9%). Less frequent types included Chronic Myeloid Leukemia (7%) and Acute Lymphocytic Leukemia (5%). (Table 5)

Table 5: Diagnosis of Different Types of Malignancy with Prevalence (n=100)

Cancer type	Frequency	Percentages
Non-Hodgkin's Lymphoma	34	34%
Acute myeloid leukemia	12	12%
Hodgkin's Lymphoma	11	11%
Chronic lymphocytic leukemia	9	9%
Chronic myeloid leukemia	7	7%
Acute lymphocytic leukemia	5	5%
Multiple myeloma	17	17%

This table presents a comparison of hematological parameters before and after treatment among 100 patients. A statistically

significant improvement was observed in ESR (reduced from 90.7 ± 13.1 to 18.0 ± 5.8 , $p = 0.001$), WBC count (reduced from 15.5 ± 4.7 to 8.5 ± 2.17 , p

= 0.031), and bone marrow plasma cell percentage (decreased from 69% to 18%, $p = 0.001$), indicating effective disease control. Although there was an increase in hemoglobin concentration and a slight

decrease in platelet count after treatment, these changes were not statistically significant ($p > 0.05$). (Table 6)

Table 6: Descriptive Statistics of Hematological Findings of the Patient (n=100)

Hematological report	Baseline or before treatment	After treatment	P value
ESR (mm1st hour)	90.7±13.1	18.0±5.8	0.001s
Hb conc.(g/dl)	8.4±2.6	10.7±4.2	0.194ns
WBC count	15.5±4.7	8.5±2.17	0.031s
Platelet count	130.1±43.7	114.8±39.7	0.201ns
Bone marrow (plasma cell)	69%	18%	0.001s

This table shows the comparison of biochemical parameters before and after treatment among 100 patients. The findings indicate no statistically significant changes ($p > 0.05$) in any of the measured parameters following treatment.

While there were minor fluctuations—such as reductions in creatinine, LDL, β 2-microglobulin, and serum albumin, and slight increases in fasting and 2-hour glucose—none of these changes reached statistical significance. (Table 7)

Tables 7: Distribution of the Study Patients by Biochemical Report (n = 100)

Biochemical report	Baseline or before treatment	After treatment	value
FBS (mmol/L)	5.7±1.1	6.0±1.8	0.480ns
2hsABF (mmol/L)	8.4±2.6	9.7±4.2	0.194ns
Calcium(mg/dl)	9.21±2.34	9.05±2.17	0.501 ^{ns}
Creatinine (mg/dl)	2.3±0.8	1.4±0.2	0.091ns
LDL (mg/dl)	130.1±43.7	114.8±39.7	0.201ns
HDL (mg/dl)	37.5±8.02	38.5±10.0	0.698 ^{ns}
TG (mg/dl)	206.9±96.3	201.1±85.9	0.823 ^{ns}
Serum bilirubin (mg/dl)	0.11±0.01	0.12±0.04	0.876ns
ALT (U/L)	55.8±33.2	53.2±68.8	0.865ns
AST (U/L)	55.7±37.2	45.2±33.5	0.299 ^{ns}
AST/ALT (U/L)	1.3±1.0	1.4±1.2	0.750 ^{ns}
Prothrombin time (sec)	12.1±0.7	11.9±0.6	0.283ns
INR	1.05±0.19	1.01±0.07	0.328ns
β 2 Macroglobulin	4.5±1.7	3.1±1.2	0.319ns
Serum albumin	43.8±4.3	41.8±5.9	0.177ns
Serum ferritin	80.7±69.0	78.4±43.7	0.419ns

DISCUSSION

In this study, a notable proportion of hematological malignancy patients were in the younger age group, with 57% aged between 16 and 30 years and 26% under 15 years. This finding deviates from the conventional understanding that cancer predominantly affects older adults, particularly in hematological malignancies. The predominance of younger patients in this study may be attributed to the unique epidemiological pattern in developing countries like Bangladesh,

where environmental exposures, genetic predisposition, infectious agents (such as EBV and HIV), and earlier-life toxin exposures may play a more significant role in early-onset hematological cancers. My sample size is 100 where the sample size of 100 patients was selected based on a combination of statistical, logistical, and feasibility factors. This age pattern aligns with findings from studies in Bangladesh and other developing countries, where acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) are

frequently diagnosed in adolescents and young adults (AYA).^{11, 12}

The study also found a male predominance (57%) and urban preponderance (58%), which is consistent with previous reports in South Asian contexts where men are more frequently diagnosed due to greater healthcare access and health-seeking behavior.^{13, 14} A retrospective analysis in Bangladesh reported that 69.2% of hematological malignancy patients were male and a majority resided in urban regions.¹² Regarding risk factors, smoking was reported in 47% of patients, followed by idiopathic causes (26%) and drug exposure (23%). Smoking has been recognized as a significant contributor to AML and myelodysplastic syndromes, accounting for up to 20% of AML cases.¹⁵ Drug-related leukemogenesis has been observed with chemotherapeutic agents and other cytotoxic exposures.¹⁶ Clinically, generalized weakness (87%) and fever (72%) were the most frequent presenting symptoms. These symptoms are common in hematological malignancies due to anemia, neutropenia, and immune suppression.¹⁷ Anemia (81%) was the most common sign, followed by lymphadenopathy (24%) and hepatosplenomegaly (18%). These findings are indicative of bone marrow involvement and systemic infiltration by malignant cells, which mirrors the results from other population-based studies.¹⁸ Non-Hodgkin's lymphoma (NHL) was the most frequently diagnosed malignancy (34%), followed by multiple myeloma (17%) and AML (12%). These findings reflect the global distribution of hematologic cancers where NHL is highly prevalent, especially in low- and middle-income countries.¹⁹ The pattern is consistent with data from the International Agency for Research on Cancer (IARC) and national registries in the South Asian region.²⁰ The study demonstrated statistically significant improvements in haematological indices post-treatment. Erythrocyte sedimentation rate (ESR) dropped significantly from 90.7 ± 13.1 to 18.0 ± 5.8 ($p = 0.001$), and total white blood cell (WBC) count decreased from 15.5 ± 4.7 to 8.5 ± 2.17 ($p = 0.031$). This reflects effective cytoreduction and marrow recovery after chemotherapy, a trend also observed in similar studies involving leukemia patients undergoing induction therapy.^{21, 22} However, biochemical markers such as serum creatinine and liver enzymes showed no significant

changes, which could be attributed to renal and hepatic function preservation or the use of nephro and hepatoprotective agents during treatment. This observation is in agreement with studies that reported stable biochemical profiles in patients without pre-existing organ impairment.²³ These findings underscore the need for early diagnosis, especially in younger populations, and the importance of integrated oncology care for haematological malignancies. Future multicenter prospective studies are needed to explore long-term treatment outcomes and survival.

Limitations of the Study

This study had several limitations. Firstly, it was conducted in a single tertiary care hospital, which may limit the generalizability of the findings to broader populations or other healthcare settings. Secondly, the sample size was relatively small ($n=100$), which may not fully represent the spectrum of hematological malignancies. Thirdly, the use of purposive sampling introduces selection bias, as it may not reflect the true prevalence or distribution of disease in the general population. Additionally, the cross-sectional design restricted the ability to assess long-term outcomes or treatment effectiveness over time. Lastly, some diagnostic and prognostic investigations were not available for all patients due to resource constraints, which may have influenced the comprehensiveness of the clinical assessment.

CONCLUSION

The study's findings may offer valuable insights into the key facts and figures regarding various hematological malignancies in Bangladesh. More studies should be carried out on larger scales to develop an updated national cancer registry in Bangladesh.

Recommendations

Based on the study findings, it is recommended to enhance public awareness for early detection of hematological malignancies and implement a national cancer registry for accurate data collection. Diagnostic and treatment facilities should be strengthened, especially in regional centers. Standardized treatment protocols tailored to local needs are essential. Larger, multicenter studies are encouraged to better understand disease patterns and outcomes. Preventive

strategies targeting modifiable risk factors, such as smoking, should also be prioritized.

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